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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

MERCEDES, DISMERY E

ART UNIT

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2627

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07/30/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 09/940,475	Applicant(s) SAWAGUCHI ET AL.	
	Examiner Dismery E. Mercedes	Art Unit 2627	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 July 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 and 27-46 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 27-42 is/are allowed.
- 6) ☒ Claim(s) 1,6-12,17-24,43-46 is/are rejected.
- 7) ☒ Claim(s) 2-5 and 13-16 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 October 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 7/13/2007 has been entered.

Claim Objections

1. The claims 2,3,13,14,27-28 are objected to because they include reference characters, which are not enclosed within parentheses.

Reference characters corresponding to elements recited in the detailed description of the drawings and used in conjunction with the recitation of the same element or group of elements in the claims should be enclosed within parentheses so as to avoid confusion with other numbers or characters which may appear in the claims. See MPEP § 608.01(m).

For example, Claim 2 makes reference to “k” but no formulas are associated or presented with “k”. Limitations in () are not given patentable weight. Claim 27, makes reference to “α” but no formulas are associated or presented with “α”. Appropriate correction is required

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1,6-8, 12,17-19,23-24,43,45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dudley et al. (US 5,583,706) in view of Mallary et al. (US 6,359,744).

As to Claim 1, Dudley et al. discloses a magnetic recording/reproducing apparatus comprising a reproducing head constituted by a magneto resistive effect type head with a shield film (col.12, line 40), wherein a reproduced signal outputted from said reproducing head is processed through a partial response equalization circuit (col.7, line 50-55 and Table 1) having a frequency characteristic so that a low-frequency component of said reproduced signal including a direct current component is partially suppressed but not completely cut off through said partial response equalization circuit; and wherein said reproduced signal is supplied to a maximum-likelihood decoder so as to be data-reproduced (figs.3-6 and col.6, lines 1-24, 45-50 and col.8, line 53-9, line 45 and col.12, lines 21-43—wherein Dudley discloses processing the read signal through a partial response channel and adjusting and passing (i.e. partially suppressing but completely cut off) the low frequency component including the DC offset component and then are sent to the discrete time sequence detector i.e. maximum likelihood decoder, for further processing). Dudley et al. fails to specifically disclose a perpendicular magnetic recording double-layer medium with a soft magnetic underlayer. However, Mallary et al. discloses a perpendicular dual layer medium with a soft underlayer (fig.3, 115 and 120). Therefore, at the time of the invention, it would have been obvious to a person of ordinary skill in the art, , to modify Dudley's invention by implementing a perpendicular medium as disclosed by Mallary, the motivation being to provide the apparatus with

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increased capacity, reduced error and high level of retention of signals (see col.2, lines 45-46 of Mallery et al.).

As to Claim 6, Dudley et al. further discloses a plurality of partial response equalization circuits defined by different values of parameter α respectively, wherein a reproduced signal from said reproducing head is supplied to said plurality of partial response equalization circuits so as to be waveform-equalized in said partial response equalization circuits (see figs.3-4, 6 and respective descriptions thereof, wherein different values of parameters are used in the partial equalization circuits to generate a waveform equalized output).

As to Claim 7, Dudley et al. further discloses wherein one of different direct current frequency component passing characteristics or one of different values of parameter α is selected and set in said partial response equalization circuit, and wherein said reproduced signal from said reproducing head is supplied to said partial response equalization circuit so as to be waveform-equalized (see figs.3-4, 6 and respective descriptions thereof, wherein different values of parameters are used in the partial equalization circuits to generate a waveform equalized output).

As to Claim 8, Dudley et al. further discloses wherein at least one of said different direct current frequency component passing characteristics is a cut-off characteristic of a direct current frequency component, or at least one of different values of said parameter α satisfies a condition of $\alpha = 1$ (col.9, lines 55-56 wherein Dudley discloses programmable threshold (cut off) to compare the sample values; and col.12, lines 21-43).

As to Claim 10, Dudley et al. further discloses wherein an information data bit sequence to be recorded is converted into a data bit sequence so that a maximum number m of consecutive recording transitions recorded at a shortest bit length interval on said recording medium is limited to

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a finite value, and then said converted data bit sequence is recorded on said recording medium (col.7, lines 20-33).

As to Claim 11, Dudley et al. further discloses, wherein said maximum number m of consecutive recording transitions is limited to be not larger than 4 (col.7, lines 20-33 and fig.5 and col.9, lines 34-36).

As to Claims 23-24 Dudley et al. further discloses A semiconductor integrated circuit, wherein a magnetically recorded/reproduced signal processing circuit described in Claim 12 is mounted thereon; (claim 24) wherein a semiconductor integrated circuit stated in Claim 23 is mounted thereon (see figs.3-4, and col.1, line 14).

As to Claims 12,17-19,21,22,43,45 have limitations similar to those treated in the rejection of claims 1,6-8,10-11 and are met by the references as discussed above.

3. Claims 9,20,44,46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dudley et al. (US 5,583,706) in view of Mallary et al. (US 6,359,744), further in view of Ziporovich (US 5,459,679).

As to Claim 9, the combination of Dudley et al. and Mallary discloses the apparatus as claimed in claim 8, but fails to specifically disclose wherein a signal for adjusting or controlling a circuit disposed in a pre-stage of said partial response equalization circuit is referred to from a circuit in a post-stage of said partial response equalization circuit having said cut-off characteristic of said DC frequency component, or from a Circuit in a post-stage of said response equalization circuit having said parameter α satisfying $\alpha = 1$. However, Ziporovich is relied upon for disclosing a DC offset control circuit comprising a post state equalization of the signal (Col. 8, under "DC Offset Control Loop", wherein Ziporovich teaches the post stage equalization of the signal in order to cut

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off the offset. See also Col. 12, L. 56-63 of Ziporovich). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the apparatus as disclosed by Dudley et al. and Mallary et al. with teachings as disclosed by Ziporovich the motivation being to provide the apparatus with DC offset control without affecting other signal processing control loops.

As to Claims 20,44,46 have limitations similar to those treated in the rejection of claim 9 and are met by the references as discussed above.

Allowable Subject Matter

4. Claims 2,3,13-14,27-28 are objected to but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding Claim 2, the primary reason for allowable subject matter is the inclusion of the limitation "wherein reproduced waveforms corresponding to a pair of the two closest recording transitions recorded on said recording medium at a shortest bit length interval are outputted as a waveform having intersymbol interference with amplitude ratios $(A_1, A_2, A_3, \dots, A_k, \dots, A_N)$ (k is an integer indicating a bit interval, and A_1 and A_N are non-zero real numbers with opposite signs: $A_1 + A_2 + A_3 + \dots + A_k + \dots + A_N \neq 0, N \geq 2$) at each bit interval through said partial response equalization circuit, or as a dipulse waveform having asymmetrical amplitudes with opposite polarities through said partial response equalization circuit; and wherein said outputted waveforms are supplied to said maximum-likelihood decoder so as to be data-reproduced."

Regarding Claim 27, the primary reason for allowance subject matter is the inclusion of the limitation "wherein said reproduced waveform corresponding to a pair of the closest two recording transitions recorded on said recording medium at a shortest bit length interval are outputted as a waveform having intersymbol interference with amplitude ratios $(P_1, P_2 - \alpha P_1, \dots, P_k - \alpha P_{k-1}, \dots, P_N - \alpha$

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$P_{N-1}, \dots, \alpha \cdot P_N$) (α is a value of a real number in a range of $0 < \alpha < 1$, k is an integer indicating a bit interval, $P_1, P_2, \dots, P_k, \dots, P_N$ are real numbers with the same sign and P_1 and P_N : non-zero real numbers: $N \geq 2$) at each bit interval through said partial response equalization circuit.”

5. Claims 4-5, 15-16, 29-42 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: Sugawara et al. (US 5,790,335); Khullar (US 5,838,735); Ziporovich (US 6,025,965); Tonami (US 6,445,622).


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dismery E. Mercedes whose telephone number is 571-272-7558. The examiner can normally be reached on Monday - Friday, from 9:00am - 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrea Wellington can be reached on 571-272-4483. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


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